

## CLAIMS

1. A detection system of a segment including a specific sound signal detects a segment including sounds similar to a reference signal that is a specific sound signal from stored signals, comprising:
  - a reference signal spectrogram division portion which divides a reference signal spectrogram that is a time-frequency spectrogram of the reference signal into spectrograms of small-regions that are small-region reference signal spectrograms;
  - 10 a small-region reference signal spectrogram coding portion which encodes the small-region reference signal spectrogram to a reference signal small-region code;
  - a small-region stored signal spectrogram coding portion which encodes a small-region stored signal spectrogram that is a spectrogram of a small-region in a stored signal spectrogram which is a time-frequency spectrogram of the stored signal to a stored signal small-region code;
  - 15 a similar small-region spectrogram detection portion which detects a small-region spectrogram similar to the small-region reference signal spectrograms respectively based on a degree of similarity of a code from the small-region stored signal spectrogram; and
  - 20 a degree of segment similarity calculation portion which uses a degree of small-region similarity of a small-region stored signal spectrogram similar to the small-region reference signal spectrogram in detected stored signal spectrograms and calculates a degree of similarity between the segment of the stored signal including the small-region stored signal spectrogram and the reference signal, wherein:
    - the detection system of a segment including a specific sound signal detects the segment including a sound in the stored signals similar to the reference signal based on the degree of segment similarity.

2. The detection system of a segment including a specific sound signal according to claim 1, wherein:

the small-region reference spectrogram coding portion and the  
5 small-region stored signal spectrogram coding portion use power spectrum values of each point on the small-region spectrogram as a feature vector, and calculate the reference signal small-region code and the stored signal small-region code respectively by quantizing the feature vector.

10 3. The detection system of a segment including a specific sound signal according to claim 1, wherein:

the small-region reference spectrogram coding portion and the small-region stored signal spectrogram coding portion respectively generate the reference signal small-region code and the stored signal small-region  
15 code by encoding a spectrum feature at each time point in the small-region spectrogram to a code, generating a histogram by counting up appearance of the code in the small-region spectrogram, generating a histogram feature that is a feature vector constructed from bin counts in the histogram, and encoding the histogram feature by vector quantization.

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4. The detection system of a segment including a specific sound signal according to one of claims 1, wherein:

the similar small-region spectrogram detection portion, with respect to the small-region reference signal spectrogram, compares  
25 sequentially based on the degree of small-region similarity to the small-region stored signal spectrograms of a list in which the small-region stored signal spectrograms corresponding to a frequency band of the small-region reference signal spectrogram are ordered in time-series, and detects only similar small-region stored signal spectrograms.

5. The detection system of a segment including a specific sound signal according to one of claims 1, further comprising;

5 function which, with respect to the small-region codes calculated by encoding the small-region spectrogram, generates a table of degree of similarity among small-region codes by calculating degree of similarity among all small-region codes, wherein:

10 the similar small-region spectrogram detection portion detects similarity between the small-region reference signal spectrogram and the small-region stored signal spectrogram by referring to the table of degree of similarity among small-region codes.

6. The detection system of a segment including a specific sound 15 signal according to one of claim 5, further comprising;

an index generation function which generates an index in which appearance time points in the stored signal are grouped by using the small-region codes, wherein:

20 the similar small-region spectrogram detection portion refers to the index using the small-region code similar to the reference signal small-region code selected by referring to the table of degree of similarity among small-region codes, and detects the small-region stored spectrogram having the small-region code as the small-region stored signal spectrogram similar to the small-region reference signal spectrogram.

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7. A detection method of a segment including a specific sound signal which detects a segment including sounds similar to a reference signal that is a specific sound signal from stored signals, comprising the steps of:

a reference signal spectrogram division step which divides a

reference signal spectrogram that is a time-frequency spectrogram of the reference signal into spectrograms of small-regions that are small-region reference signal spectrograms;

5 a small-region reference signal spectrogram coding step in which the small-region reference signal spectrogram is encoded to a reference signal small-region code;

10 a small-region stored signal spectrogram coding step in which a small-region stored signal spectrogram that is a spectrogram of a small-region in a stored signal spectrogram which is a time-frequency spectrogram of the stored signal, is encoded to a stored signal small-region code;

15 a similar small-region spectrogram detection step in which a small-region spectrogram similar to the small-region reference signal spectrograms is detected respectively from the small-region stored signal spectrogram based on a degree of similarity of a code; and

20 a degree of segment similarity calculation step which uses a degree of small-region similarity of a small-region spectrogram similar to the small-region reference signal spectrogram in detected stored signal spectrograms and calculates a degree of similarity between the segment of the stored signal including the small-region stored signal spectrogram and the reference signal, wherein:

the detection method of a segment including a specific sound signal detects the segment including a sound in the stored signals similar to the reference signal based on the degree of segment similarity.

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8. The detection method of a segment including a specific sound signal according to claim 7, wherein:

in the small-region reference spectrogram coding step and the small-region stored signal spectrogram coding step, power spectrum values

of each point on the small-region spectrogram as a feature vector are used, and the reference signal small-region code and the stored signal small-region code are calculated respectively by quantizing the feature vector.

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9. The detection method of a segment including a specific sound signal according to claim 7, wherein:

in the small-region reference spectrogram coding step and the small-region stored signal spectrogram coding step, the reference signal 10 small-region code and the stored signal small-region code are respectively generated by encoding a spectrum feature at each time point in the small-region spectrogram to a code, generating a histogram by counting up appearance of the code in the small-region spectrogram, generating a histogram feature that is a feature vector constructed from bin counts in 15 the histogram, and encoding the histogram feature by vector quantization.

10. The detection method of a segment including a specific sound signal according to one of claims 7, wherein:

the similar small-region spectrogram detection step, with respect 20 to the small-region reference signal spectrogram, compares sequentially based on the degree of small-region similarity to the small-region stored signal spectrograms of a list in which the small-region stored signal spectrograms corresponding to a frequency band of the small-region reference signal spectrogram are ordered in time-series, and only similar small-region 25 stored signal spectrograms are detected.

11. The detection method of a segment including a specific sound signal according to one of claims 7, further comprising;

a step which, with respect to the small-region codes calculated by

encoding the small-region spectrogram, generates a table of degree of similarity among small-region codes by calculating degree of similarity among all small-region codes, wherein:

the similar small-region spectrogram detection step detects  
5 similarity between the small-region reference signal spectrogram and the small-region stored signal spectrogram by referring to the table of degree of similarity among small-region codes.

12. The detection method of a segment including a specific sound  
10 signal according to claim 11, further comprising:

an index generation step which generates an index in which appearance time points in the stored signal are grouped by using the small-region codes, wherein:

the similar small-region spectrogram detection method refers to the  
15 index using the small-region code similar to the reference signal small-region code selected by referring to the table of degree of similarity among small-region codes, and detects the small-region stored spectrogram having the small-region code as the small-region stored signal spectrogram similar to the small-region reference signal spectrogram.

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13. A detection program of a segment including a specific sound signal operates a computer to work as the detection system of a segment including a specific sound signal according to one of claims 1.

25 14. A computer readable medium storing the detection program of a segment including a specific sound signal according to claim 13.